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BY

C. L. GIBSON, M.D.

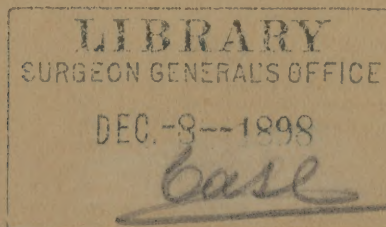
NEW YORK

ATTENDING SURGEON, ST. LUKE'S HOSPITAL

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*Reprint from the MEDICAL RECORD, July 17, 1897*

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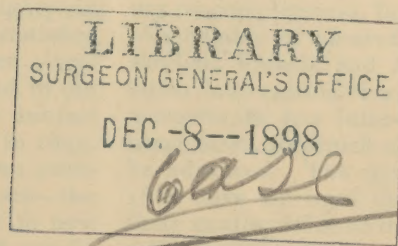
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# MORTALITY AND TREATMENT OF ACUTE INTUSSUSCEPTION,

WITH TABLE OF  
TWO HUNDRED AND THIRTY-NINE CASES.<sup>1</sup>

By C. L. GIBSON, M.D.,

NEW YORK,

ATTENDING SURGEON, ST. LUKE'S HOSPITAL.

IN the course of a systematic study of the recent literature of intestinal obstruction the writer's interest was particularly attracted, by the occurrence of several prominent features, to that variety due to invagination of the various segments of the intestinal tract. These were that intussusception, while presenting conditions allowing of easy and certain diagnosis much oftener than observed in other forms of obstruction, was nevertheless attended with no lesser mortality; again, that invagination of the intestines, unlike other varieties of obstruction, could in a certain proportion of cases be relieved by mechanical non-operative measures, and yet remained one of the most fatal.

A third point was the variance exhibited by the statistics collected by different authors, as exemplified by Rydygier in 1895, giving a mortality of seventy-five per cent. in acute cases, and Wiggins in 1896, whose statistics in recent times and after the exclusion of certain conditions gave a mortality of twenty-two per cent. The conclusions reached by the latter writer in his most careful paper have been widely quoted and his painstaking work has received most favorable comment.

To the writer the low figure (twenty-two per cent. mortality) just quoted could not appeal, and it seemed to him that if he must answer his own query, why he was attempting to add to an already congested literature, he might find a reply in the effort to present the subject in a broader light. The essential reason, however, for writing this paper is to place on record a more extensive literature of the operative relief of acute intussusception than has ever been attempted before, the writer believes, in English or any other language. Rydygier in 1895 read a most exhaustive paper before the German Surgical Congress, based on his own large experience and the cases reported in the literature for the previous ten years (eighty-six cases), taking up the subject where Braun's statistics had paused in 1885. Braun's table contained sixty-six cases, going back to the earliest recorded in the seventeenth century. The literature of the subject then, as compiled by these German authors in 1895, comprised a total of one hundred and fifty-two cases treated by abdominal section, in which all cases—the chronic, lasting perhaps for years; those due to new growths, and therefore attended with special conditions; and the purely acute forms—were all included. But very slight observation convinced the writer of the necessity of a very definite separation of these forms for the purpose of studying the results of their treatment, and of the lack of a single exhaustive collection of cases of the acute form from which to attempt to derive fair conclusions.

The writer has collected two hundred and thirty-nine cases, divided into two classes: those occurring prior to 1888, eighty-nine cases, and those occurring since

1887, up to January 1, 1897, one hundred and fifty cases.

The division of time is somewhat arbitrary, representing in the second table the writer's convenience as to a part of his studies on the general subject of intestinal obstruction since 1887. These later years present conditions which make a comparative study of intestinal surgery most valuable. Antisepsis had already become quite well established and subsequently was reinforced by asepsis. Union of divided or non-adjacent portions of the intestine by mechanical aids had at the opening of this period been shown to be of great value, both in the improvement of results and in the encouragement of more frequent surgical interventions. The increased frequency of operations following familiarity with the possibilities of artificial methods of anastomosis led to eager efforts to improve the existing means, resulting in increased and better methods of suture and the temporary passing of the mechanical devices. In the latter part of this period, the best of these devices, the Murphy button, soon after its introduction in 1892, came to compete with and, to a great extent, divert attention from the improved methods of suture.

Then, again, many of the operators were no longer pioneers in the branch of abdominal surgery, relying on themselves to evolve measures of certain value, and the younger generation in its earlier efforts was now guided by the valuable teaching of the riper experience of its predecessors. The second table will therefore be used exclusively for the study of the conditions from which a fair estimate of the results obtained may be derived. Though the writer can claim an honest attempt to approach the subject by painstaking efforts of research, he has no illusions concerning its completeness, for he is aware of the existence of a number of observations in the literature of the English, French, and German languages that were either inaccessible or too incomplete to utilize. And, moreover, he has little doubt that he has overlooked some cases, for which no reason but carelessness can be advanced. The records of the first series prior to 1888 have not been the subject of the same care, as their smaller value on the whole seemed not to call for a like amount of labor. They have only exceptionally been derived from their original source, having been obtained almost entirely from the tables of Braun,<sup>92</sup> Barker,<sup>93</sup> Rydygier,<sup>94</sup> and Wiggins.<sup>94</sup> They are recorded for the sake of completeness and for their possible value to other investigators.

It has seemed wisest not to attempt a systematic and equal consideration of the various divisions of the subject of intussusception; but to concentrate the observations derived from the recorded cases chiefly upon a review of the causes and elements influencing the mortality attending abdominal section, and, guided by the results thus found, to attempt the outlining of a definite

<sup>1</sup> Read by title at the pædiatric section of the American Medical Association, June 3, 1897.



## MORTALITY AND TREATMENT OF ACUTE INTUSSUSCEPTION.

TABLE I. (CASES PRIOR TO 1888). SECTION A—DIED.

Case No.	Operator.	Year.	AGE.		Sex.	Duration, Days.	Anatomical Variety.	Symptoms.	Previous Treatment.	Operation.	Remarks.
			Mos.	Years.							
1	Beck, 74*	1877	8	..	F.	2	Ileo-cæcal.	.....	Enemata.	Reduction (?).	
2	Beck, 74	1882	..	12	..	2	"	.....	.....	"	
3	Busch, 74	1869	2	..	M.	4	.....	.....	.....	Artificial anus.	
4	Braun, 92	1882	3	..	M.	5	Ileo-colic.	Blood, mucus; felt in rectum.	Enemata; partial reduction.	Resection 80 cm., E.-E.† anastomosis, suture.	
5	Beck, 92	1885	15	..	M.	3	Ileo-cæcal.	.....	Enemata.	Irreducible.	
6	Bell, 92	1875	6	..	F.	6	Sigmoid-colon.	Felt in rectum.	Enemata, air and water.	Irreducible, artificial anus.	
7	Brown, 92	1882	..	14	M.	1	.....	.....	.....	Irreducible, artificial anus.	
8	Bruns, 44	1886	..	13	M.	4 weeks; acute.	Ileo-cæcal.	.....	.....	Resection 150 cm.	Post mortem, anastomosis perfect
9	Corley, 74	1879	2	..	M.	Some days.	Ileo-colic.	.....	.....	Resection 47 cm. ileum, E.-E., Czerny suture.	
10	Czerny, 92	1883	..	36	F.	8	Ileo-cæcal.	Vomit; not felt in rectum.	.....	Irreducible, artificial anus.	
11	Carnes, 92	1866	..	23	M.	5	"	.....	.....	.....	
12	Duncan, 74	1873	5	..	..	..	"	.....	.....	.....	
13	Davies-Colley, 52	1881	..	2	M.	10	Ileo-cæcal.	.....	.....	Resection.	
14	Fischer, 92	1881	27	..	F.	..	Enteric.	.....	.....	Reduction.	
15	K. Franks, 44	Before 1886	..	Adult.	M.	8	.....	.....	.....	.....	
16	Foxwell, 52	1886	Child.	..	M.	10	.....	.....	.....	.....	
17	Gerson, 74	1828	3	..	M.	Acute.	Ileo-cæcal.	.....	.....	Incomplete operation.	
18	Godlee, 74	1882	3	..	..	..	.....	.....	.....	Irreducible.	
19	Godlee, 74	1883	7	..	..	3	Ileo-cæcal.	.....	Enemata.	Reduction difficult.	
20	Hauff, 92	1841	..	36	M.	3; chronic and acute.	"	Prolapsed.	.....	Artificial anus.	
21	Hirschsprung, 92	1871	22	..	F.	..	Colon.	Blood and mucus.	.....	" "	
22	Hutchinson, 74	1875	6	..	..	3	Ileo-cæcal.	.....	Enemata.	Reduction difficult.	
23	Horsley, 74	1885	4	..	M.	4	"	.....	.....	Artificial anus.	
24	Horsley, 74	1885	5	..	M.	21	"	.....	.....	.....	
25	Howard, 92	1882	17	..	..	5	"	Blood.	.....	Reduction; puncture of intestine.	Post mortem, peritonitis.
26	Howse, 92	1876	5	..	..	Acute.	.....	Blood and mucus.	.....	Gut ruptured in reduction; suture.	
27	Küster, 92	1879	..	42	M.	6	Enteric.	Fæcal vomit; blood.	.....	Resection, E.-E. anastomosis; Lembert.	Pre-existing peritonitis.
28	Jacobson, 52	1885	11	..	..	1	.....	.....	.....	Irreducible.	
29	Jaeger, 92	1885	..	12	F.	2	Enteric.	Vomit; not felt in rectum.	.....	Resection 80 cm., E.-E. anastomosis, Lembert; 1½ hours.	Post mortem, beginning gangrene, line of suture.
30	Jacobi, 74	1882	2	..	F.	1 (18 hrs.)	.....	.....	Enemata.	Reduction difficult.	
31	Jacobson, 74	1886	5	..	M.	21	.....	.....	.....	Resection.	
32	Little, 92	1878	..	5	M.	1	Ileo-cæcal.	.....	.....	Reduction.	
33	Laroyenne, 92	1870	Child.	..	..	..	.....	.....	.....	Irreducible.	
34	Marsh, 74	1882	8	..	F.	2	.....	.....	.....	Artificial anus.	
35	Marsh, 92	1878	..	..	M.	6	.....	.....	.....	Reduction.	
36	Mikulicz, 92	1883	..	24	F.	10	Ileo-colic.	.....	Enema.	"	Pyæmia.
37	Morris, 92	1877	..	12	M.	3	Enteric.	Blood, vomit; felt in rectum.	.....	Resection; artificial anus of ends.	Post mortem, supposed intussusception felt in rectum was a clot of blood.
38	Müller, 92	1872	..	33	M.	7; chronic and acute.	Ileo-cæcal.	Vomit.	.....	Artificial anus.	Post mortem, intussusception gangrenous.
39	Owen, 74	1885	3 days.	..	F.	3	"	.....	Enemata.	" "	
40	Ohle, 92	1810	..	50	M.	13	"	.....	Incision of intuss. protruding at anus.	Reduction, suture of colon, threads brought outside belly.	Post mortem, gangrene of colon.
41	Obalinski, 92	1883	..	63	M.	5	Enteric.	Fæcal vomit; not felt in rectum.	.....	Resection 90 cm.	Septic peritonitis.
42	Obalinski, 44	1885	..	38	F.	8	Colon-sigmoid	.....	.....	Artificial anus.	Post mortem, pre-existing peritonitis.
43	Obalinski, 44	1887	3	..	..	3	Ileo-cæcal.	.....	.....	Reduction.	
44	Pick, 74	1887	6	..	..	4	Enteric.	.....	Enemata.	Invagination not found.	
45	Page, 92	1878	..	5	..	Chronic and acute.	Ileo-cæcal.	.....	.....	Reduction.	
46	Pollard, 92	1882	..	3	F.	7	Ileo-colic.	Mucus; felt in rectum.	.....	Resection ileo-cæcal coil.	Post mortem, operative condition perfect.
47	Robert, 92	1852	..	23	F.	18	Sigmoid into descending colon.	Vomit, blood.	.....	Artificial anus.	
48	Rosenbach, 92	1884	..	6	M.	8	.....	Blood, mucus; felt in rectum.	Enemata and reduction first day; enemata and partial reduction second day; enemata daily till operation.	Reduced with difficulty; necrotic portion treated extraperitoneally.	
49	Rydygier, 44	1884	..	39	M.	4	Ileo-cæcal.	.....	.....	Reduction.	
50	Robson, 52	1885	..	33	F.	7	Enteric.	.....	.....	Resection.	
51	Sands, 74	1878	6	..	F.	2	Ileo-cæcal.	.....	.....	.....	
52	Symonds, 74	1884	5	..	M.	20	"	.....	.....	.....	
53	Symonds, 74	1884	6	..	M.	20	"	.....	.....	.....	
54	Stage, 74	1876	6	..	F.	2	"	.....	.....	Artificial anus.	
55	Smith, 74	1877	8	..	M.	5	"	.....	Enemata.	Resection.	
56	Stage, 74	1880	3	..	M.	1	.....	.....	.....	.....	
57	Strong, 40	1887	1	..	M.	1 (22 hrs.)	.....	Blood.	Enema under chloroform.	Reduction.	Convulsions; no abdominal manifestations after operation.
58	M. Schmidt, 44	1887	..	10	F.	..	Enteric.	.....	.....	Artificial anus.	
59	B. Schmidt	1887	..	4	..	8	Double (reverse) colon.	.....	.....	Resection, E.-E., Czerny suture.	
60	Schattauer, 44	Before 1887	..	9	F.	20	Colon.	.....	.....	Reduction difficult; two tears in peritoneum.	Post mortem, necrosis and perforation at neck.
61	v. Thaden, 92	1862	..	23	M.	..	Ileo-colic.	.....	.....	Artificial anus.	Gangrene of intuss.
62	Van Arsdale, 74	1887	5	..	..	..	.....	.....	.....	"	
63	Van Arsdale, 74	1887	5	..	..	..	.....	.....	.....	Operation incomplete.	
64	Van Arsdale, 74	1887	5	..	..	..	.....	.....	.....	Artificial anus.	
65	v. Wahl, 44	1886	..	52	M.	1 (20 hrs.)	Ileo-colic.	.....	.....	Reduction.	Pulmonary cedema.
66	Winiwarter, 92	1885	..	60	M.	6	Colon.	.....	.....	Irreducible, artificial anus.	
67	v. Wahl, 92	1883	..	44	F.	10	Ileo-cæcal.	Prolapse at anus.	Manual reposition.	.....	
68	Wells, 74	1863	4	..	M.	..	"	.....	.....	.....	
69	Weinlechner, 74	1817	6	..	F.	4	"	.....	.....	.....	
70	Weinlechner, 92	1880	..	5	M.	3	Colon.	Vomit, blood; felt in rectum.	Enemata, air and water, second day.	Resection 56 cm., E.-E. anastomosis.	
71	Walsham, 74	1882	7	..	F.	3	.....	.....	Enemata.	Reduction difficult.	
72	Zielewicz, 13	1887	..	47	F.	8	Ileum and trans. colon into sigmoid.	.....	.....	"	Post mortem, perforation transverse colon.

\* Corresponding number of bibliographical index

† End to End.



TABLE I. SECTION B—CURED.

Case Number.	Operator.	Year.	AGE.		Sex.	Duration, Days.	Anatomical Variety.	Symptoms.	Previous Treatment.	Operation.	Remarks.
			Months.	Years.							
73	Bellamy, 74*	1879	..	34	F.	4	Lateral invagination, small intest. into sigmoid.	Fæcal vomit.	.....	Reduction.	
74	Borch, 44	Before 1885	..	(?) 30	M.	2	Enteric.	.....	.....	"	
75	Carver, 54	1887	..	2	..	7 weeks and acute.	Ileo-cæcal.	Fæcal vomit, blood; felt in rectum.	.....	Reduction, 50 minutes.	
76	Czerny, 92	1884	..	52	F.	Chronic and acute.	"	.....	.....	Resection ileo-cæcal coil, E.-E., Czerny suture, 95 minutes.	
77	Fuchs, 92	1824	..	28	M.	9	.....	.....	.....	Reduction after incision of sheath, purse-string suture of incision.	
78	Godlee, 74	1881	9	..	..	4	Ileo-cæcal.	.....	Massage and inflation.	Reduction easy.	
79	Gay, 17	1886	5	..	F.	3	"	.....	.....	Reduction.	
80	Heald and Irish, 18	1885	..	25	M.	6	"	.....	.....	Reduction.	
81	Howse, 92	1874	..	33	M.	18	.....	.....	.....	Reduction difficult.	
82	Kleeberg, 92	1879	..	40	M.	1	Double colon.	.....	.....	"	
83	Marsh, 44	1875	6	..	M.	1	Ileo-cæcal.	.....	Enemata.	Reduction easy.	
84	Nuck, 92	1692	..	50	F.	..	.....	.....	.....	Reduction.	
85	Sands, 44	1877	6	..	F.	1 (12 hrs.)	Ileo-cæcal.	.....	Enemata, air and water.	Reduction difficult.	
86	Snowball, 44	1886	8	..	M.	1	.....	.....	Inflation.	Reduction easy.	
87	Stelzner, 44	Before 1884	..	54	M.	12	Enteric.	.....	.....	Reduction; rupture and suture of gut.	
88	Schattauer, 44	Before 1887	8	..	..	Some hours.	.....	.....	.....	Reduction.	
89	Wilson, 92	1831	..	20	M.	17	Enteric.	.....	.....	Reduction; gut very suspicious.	

TABLE II. (CASES SINCE 1887). SECTION A—SUCCESSFUL ABDOMINAL SECTION FOR REDUCIBLE INTUSSUSCEPTION.

Case Number.	Operator.	Year.	AGE.		Sex.	Anatomical Variety.	Duration, Days.	Symptoms.	Previous Treatment.	Operation.	Remarks.
			Months.	Years.							
1	Annandale, 23*	1889	..	3	M.	Ileo-cæcal.	2	Blood.	Enema under anæsthetic, third day.	Reduction.	
2	Alsberg, 43	1891	..	5	M.	"	12	Blood, no vomit.	Enema (air) second day.	"	
3	Alsberg, 43	1893	..	11	M.	"	3	Blood, vomit.	.....	"	
4	Alsberg, 43	1895	..	18	M.	Hepatic flexure.	16	Blood, mucus; felt in rectum.	Inflation under anæsthetic.	Reduction, 40 minutes.	Condition bad.
5	Ainsley, 65	1895	8	..	M.	Ileo-colic.	1 (6½ hrs.)	Felt in rectum.	" Attempt to reduce invagination" (anæsthetic).	Reduction.	
6	Anderson, 77	1895	4	..	..	.....	1	.....	No enemata.	"	
7	Barker, 27	1894	4	..	M.	.....	2	.....	Enema (anæsthetic) apparently successful.	"	
8	Barker, 27	1894	5	..	M.	.....	2	.....	Enema.	"	
9	Barker, 27	1893	7	..	F.	Ileo-cæcal.	2	Blood, not felt in rectum.	Enema.	"	
10	Butler, 85	1889	..	7	F.	.....	3	Blood, mucus; not felt in rectum.	Enema.	Reduction easy.	
11	Bogart, 37	1894	5	..	M.	Cæcum and colon.	4	Felt in rectum.	.....	Reduction.	
12	Barlow, 48	1895	5	..	F.	Ileo-cæcal.	1 (18 hrs.)	Blood, vomit.	Hydrogen inflation.	"	
13	Barker, 30	1894	..	32	F.	.....	2	Blood; not felt in rectum.	.....	"	Had pneumonia.
14	Barker, 27	1889	5	..	M.	"	2	.....	Reduced by enema but recurred; 5½ hours.	"	
15	Bush, 22	1890	4	..	..	"	2	.....	Enemata.	"	
16	B. Clarke, 85	1892	6	..	F.	Colon.	1	.....	.....	Reduction difficult.	
17	Cheyne, 55	1889	..	26	F.	Ileo-cæcal.	3	Blood; felt in rectum.	.....	Reduction.	
18	Crymes, 1	1889	..	12	M.	.....	2	.....	Enema, second day; no anæsthetic.	Reduction, 30 minutes.	
19	Delcroix, 4	1890	6	..	M.	"	3	Blood, mucus; felt in rectum.	.....	Reduction.	
20	Eve, 33	1895	11	..	F.	"	1 (1 hr.)	Blood and vomit.	Enema.	"	Slight invagination, not entirely reduced by enema.
21	Gould, 2	1891	..	4	F.	Descending colon.	1	Blood.	Insufflation.	"	
22	Godlee, 27	1892	4	..	M.	Ileo-cæcal.	2	Not felt in rectum.	Enema, first day.	"	
23	Howitt, 6	1888	3	..	M.	.....	2	Blood, fæcal vomit.	Enema.	"	
24	Howitt, 6	1894	7	..	..	Ileum and colon.	2	Blood.	Insufflation.	"	
25	Harris, 70	1890	..	14	M.	Ileo-cæcal.	5	.....	.....	"	
26	Hulke (1st op.), 79	1890	..	2	M.	Enteric.	1 (7 hrs.)	Blood.	Enemata, air and water, under anæsthetic at 4 hours.	"	
27	Gould (2d op.), 79	1890	..	2	M.	.....	4	Blood and mucus.	.....	Reduction; rupture of gut; suture.	
28	Holländer (Israel), 14	1896	..	16	M.	Enteric.	..	.....	.....	Reduction.	
29	Johnson, 88	1890	..	18	M.	Descending colon.	5	Vomit.	Enemata for several days.	Reduction, 30 minutes.	
30	Kelsey, 81	1896	3	..	..	Ileo-cæcal.	1	.....	.....	Reduction.	
31	Kammerer, 71	1890	6	..	..	"	3	Blood; felt in rectum.	Enema under anæsthetic.	"	
32	Kopat, 82	1895	5	..	F.	Ileo-colic.	7	Blood and vomit.	.....	Reduction, 45 minutes.	
33	Korte, 44	1891	..	6	M.	Retrograde sigmoid in colon.	..	.....	.....	Reduction.	
34	Kollock, 92	1889	..	44	M.	Ileo-cæcal.	2	.....	.....	"	
35	Lockwood, 61	1893	8	..	M.	.....	2	.....	Enemata with anæsthetic.	"	
36	Lund, 35	1895	..	9	F.	Enteric.	7	Fæcal vomit, no blood.	.....	"	

\* Corresponding number of bibliographical index.



TABLE II. (CASES SINCE 1887.) SECTION A—SUCCESSFUL ABDOMINAL SECTION FOR REDUCIBLE INTUSSUSCEPTION.

Case Number.	Operator.	Year.	AGE.		Sex.	Anatomical Variety.	Duration, Days.	Symptoms.	Previous Treatment.	Operation.	Remarks.
			Months.	Years.							
37	Lindemann, 42*...	1891	..	11	M.	.....	3	Felt in rectum.	Enema.	Reduction; isolation of suspicious gut; art. anus in transverse colon 2 days later.	Artificial anus cured by operation.
38	Marsh and Savory, 85.	1890	9	..	M.	.....	2	Blood; felt in rectum.	.....	Reduction.	
39	McBurney, 80....	1891	..	13	M.	.....	4	Vomit; not felt in rectum.	Enema, third day.	"	
40	Meek, 75.....	....	7	..	M.	Ileo-colic.	1 (10 hrs.)	Blood.	.....	"	
41	Macewen, 46.....	1891	9	..	..	Colon.	..	.....	.....	"	
42	Neuber, 44.....	1891	..	60	..	Sigmoid-rectal.	8	.....	.....	"	
43	Obalinski, 44....	1895	..	25	F.	Ileo-cæcal.	8	.....	.....	"	
44	Ochsner, 51.....	1892	..	3	M.	"	1 (6 hrs.)	Mucus, no blood; not felt in rectum.	.....	"	
45	Perceval, 53.....	1888	..	21	M.	"	3	.....	Enema second day.	"	
46	Pilgrim, 50.....	1894	..	29	M.	Colon-rectum (recurrent).	24	.....	.....	"	
47	Pollard, 64.....	1894	7	..	F.	Ileo-cæcal	1	.....	.....	Reduction difficult.	
48	Roughton, 67.....	1893	4	..	F.	.....	1	Vomit, blood; felt in rectum.	.....	Reduction.	
49	Ridley and Beaty, 28.	...	11	..	F.	.....	11	Vomit, mucus; felt in rectum.	41 hours before enema under anæsthetic; on coming out recurred. Insufflation under anæsthetic; reduction; fæces passed; 30 hours later recurrence.	Reduction; puncture of gut to evacuate gas.	
50	Renton, 47.....	1895	9	..	..	Ileo-cæcal.	..	.....	Inflation.	Reduction.	
51	Renton, 35.....	....	11	..	..	Splenic flexure	2	.....	Enemata, air and water; kneading.	"	
52	Renton, 35.....	....	3	..	..	Ileo-cæcal.	1	.....	Enemata.	"	
53	Stretton, 66.....	1894	..	20	M.	.....	3	.....	.....	"	
54	Shepherd, 60.....	1892	..	6	F.	.....	3	Blood, vomit; felt in rectum.	Enemata with anæsthetic.	"	
55	Swift, 19.....	1888	20	..	M.	Colon-sigmoid.	2	Blood; felt in rectum.	.....	"	
56	Thompson, 25....	1891	..	10	M.	Ileo-cæcal.	4	.....	Enema second day with apparent reduction.	Reduction; puncture of intestine.	
57	Twynan, 11.....	1888	..	7	M.	Colon.	2	Vomit, mucus, and blood; not felt in rectum.	No enema.	Reduction.	
58	Univ. C. H., London, 74.	1889	5	..	F.	Ileo-cæcal.	..	.....	Enemata.	"	
59	Verrall, 26.....	1892	6	..	M.	"	5	Blood; not felt in rectum.	Enema under anæsthetic prior to operation.	"	
60	Warren, 21.....	1896	6	..	M.	.....	2	Blood and mucus; not felt in rectum.	.....	"	
61	Warren, 21.....	1896	9	..	M.	Colon.	3	Blood and mucus; not felt in rectum.	.....	"	
†	Pollard, 61 a.....	1892	6	..	M.	Ileo-cæcal.	1 (16 hrs.)	Vomit; not felt in rectum.	Enema under chloroform.	Intussusception found all reduced.	

TABLE II. SECTION B—UNSUCCESSFUL ABDOMINAL SECTION FOR REDUCIBLE INTUSSUSCEPTION.

Case Number.	Operator.	Year.	AGE.		Sex.	Anatomical Variety.	Duration, Days.	Symptoms.	Previous Treatment.	Operation.	Time of Death.	Remarks.
			Months.	Years.								
62	Alsberg, 43*.....	1894	...	1	M.	Colon.	7	Blood; felt in rectum.	Manipulation fifth day	Reduction.	8 hours.	
63	Abbe, 8.....	....	...	...	..	.....	1 (16 hrs.)	.....	.....	"	1 day.	
64	Briddon, 8.....	1894	8	..	M.	Ileo-cæcal.	1	Vomit, blood; felt in rectum.	.....	"	5 hours.	
65	Bennett, 89.....	?1895	4	..	M.	Ileo-colic.	1 (18 hrs.)	Blood.	Enema.	Reduction easy except last 3 inches; incision and suture of cæcum; beginning sloughing of colon and general peritonitis.	8 hours.	
66	Barker, 30.....	1894	5	..	M.	.....	2	Blood; felt in rectum.	Enema under chloroform; intussusception reduced; recurrence next day of signs and symptoms.	Reduction.	2 days.	Ante mortem, temperature, 107.8°; post mortem, no ulceration, no sloughing; sepsis (?).
67	Barker, 27.....	1889	16	..	M.	Ileo-cæcal.	3	No blood.	Inflation end of first 24 hours with apparent reduction.	Reduction; appearance of gut suspicious.	1 day.	Post mortem, perforation of suspicious gut.
68	Braun, 44.....	1893	5	..	M.	"	2	.....	.....	Reduction.	14 hours.	
69	Curtis, 72.....	1891	..	30	M.	"	3	Not felt in rectum.	.....	"	5 hours.	Shock.
70	B. Clarke, 85.....	1891	13	..	..	"	2	.....	.....	Reduction easy.	1 day.	Post mortem, complete reduction.
71	Crago, 12.....	1891	8	..	..	"	3	.....	.....	Reduction.	2 hours.	Post mortem, 4 inches intussusception present.
72	Cripps, 85.....	1890	5	..	M.	.....	3	Blood, mucus; felt by rectum.	Enemata twice.	Reduction easy.	2 hours.	Post mortem, intestinal paralysis.
73	Desguin, 5.....	1892	..	19	M.	Ileo-cæcal.	5	Blood.	.....	Reduction; fixation of suspicious gut in wound; subsequent opening.	5 days.	Post mortem, intestinal paralysis.
74	Eve, 33.....	1893	..	2	M.	.....	7	.....	Reduced by enema under chloroform on sixth day; recurred.	Reduction.	3 days.	Post mortem, broncho-pneumonia; no peritonitis.
75	Eve, 33.....	1893	11	..	F.	Ileo-cæcal.	1	Felt in rectum.	.....	"	1 day.	Vomited and passed blood after operation; no post-mortem.

\*Corresponding number of bibliographical index.

† This case is not included in the statistical deductions.



TABLE II. SECTION B—UNSUCCESSFUL ABDOMINAL SECTION FOR RELIABLE INTUSSUSCEPTION.

Case Number.	Operation.	Year.	AGE.		Sex.	Anatomical Variety.	Duration, Days.	Symptoms.	Previous Treatment.	Operation.	Time of Death.	Remarks.
			Months.	Years.								
76	Horsley, 27.....	1892	...	5	M.	Enteric.	7	.....	.....	Reduction; incision in gut to relieve distention.	1 day.	
77	Jollye, 58.....	1891	11	...	M.	Colon-rec-tum.	1 (15 hrs.)	Vomit, blood, mucus; felt in rectum.	Enema under chloroform.	Reduction.	2 days.	Symptoms of recurrence.
78	Korte, 44.....	1892	...	4	M.	Ileo-cæcal.	6	.....	.....	Reduction; puncture of gut.	5 hours.	Shock.
79	Lund, 35.....	1896	5	...	M.	Enteric.	..	Blood; not felt in rectum.	.....	Reduction.	8 hours.	Post mortem, second intussusception found (ileo-cæcal).
80	Lowenstein, 10...	1889	3	...	M.	Into open o m phalomesenteric duct.	..	.....	.....	Reduction; excision of duct, 40 minutes.	1 day.	
81	Lauenstein, 44....	1894	8	8	F.	Ileo-cæcal into transverse colon.	1	Blood.	.....	Reduction.	1 day.	Shock.
82	Lauenstein, 44....	1889	6	...	M.	Double colon.	5	Fæcal vomit; blood.	Enemata several days.	"	1 day.	"
83	Marsh, 85.....	1889	4	...	M.	.....	4	Blood, mucus; felt in rectum.	.....	Reduction difficult.	6 hours.	Post mortem, no peritonitis.
84	Neuber, 44.....	1891	5	...	F.	Ileo-colic.	1	Vomit, blood.	.....	Reduction.	1 day.	Post mortem, general peritonitis.
85	Nimier, 9.....	1892	...	...	M.	Double enteric.	2	Fæcal vomit.	.....	Reduction easy; duration 1½ hours.	1 hour.	
86	Obalinski, 44.....	1892	...	43	F.	.....	14	.....	.....	Reduction.	2 days.	Post mortem, septic peritonitis.
87	Obalinski, 44.....	1894	...	68	F.	Ileo-cæcal, descending colon.	3	.....	.....	"	3 days.	Post mortem, recurrence; no peritonitis.
88	Obalinski, 44.....	1894	...	46	F.	Ileo-cæcal.	6	.....	.....	"	8 hours.	Post mortem, typhoid ulcer in intussusception.
89	Pick, 56.....	1891	15	...	M.	Ileo-colic(?).	15	Blood; felt in rectum.	Enemata, air and water.	Reduction easy.	.....	On second day recurrence and reduction; post mortem, no intussusception.
90	Power, 34.....	.....	8	...	M.	"	1 (13 hrs.)	Blood.	Insufflation.	Reduction.	6 days.	Post mortem, intestinal paralysis.
91	Rydygier, 44.....	1893	...	8	M.	Colon.	4	.....	.....	"	1 day.	Post mortem, ileo-cæcal intussusception not previously seen.
92	Roberts, 3.....	1894	9	...	F.	Ileo-cæcal.	5	Felt by rectum.	.....	Reduction, 25 minutes.	1 day.	Shock.
93	Sick (Schede), 44.	1891	5	...	F.	Ileo-colic.	1	Vomit, blood.	.....	Reduction.	1 day.	Post mortem, general peritonitis.
94	Shepherd, 60...	1892	7	...	...	Entire colon-rec-tum.	3	.....	.....	Reduction; incision rectum.	3 hours.	Shock.
95	Scott, 83.....	.....	6	...	M.	Ileo-colic.	2	.....	Enema at 15 hours.	Reduction.	1 day.	Heart failure.
96	Turner and Whip-ham, 90.	1890	...	29	F.	Enteric and 2 volvuli.	2	Blood.	.....	Reduction and untwisting.	1 day.	Shock; post mortem, bowel almost gangrenous.
97	Walsham, 85.....	1890	9	...	M.	.....	3	Blood; mucus; felt by rectum.	.....	Reduction easy.	1 day.	Post mortem, small perforation in transverse colon.
98	Walsham, 85.....	1888	8	...	M.	.....	..	.....	.....	Reduction.	1 day.	
99	Weir, 96.....	1892	3	...	F.	Ileo-cæcal.	3	Vomit, blood; felt by rectum.	Inflation second day; apparent reduction.	"	1 day.	Exhaustion.

TABLE II. SECTION C—SUCCESSFUL ABDOMINAL SECTION FOR NON-REDUCIBLE INTUSSUSCEPTION.

Case Number.	Operator.	Year.	AGE.		Sex.	Anatomical Variety.	Duration, Days.	Symptoms.	Previous Treatment.	Operation.	Remarks.
			Months.	Years.							
100	Braun, 44*.....	1892	...	33	M.	Ileo-cæcal.	28	.....	.....	Irreducible; entero-anastomosis.	
101	Banks, 31.....	1894	...	7	M.	Enteric.	7	Blood; not felt in rectum.	.....	Resection, 18 inches from valve; E.-E., Murphy button.	Button passed, 19 days.
102	Cripps, 36.....	.....	...	23	F.	.....	8	Fæcal vomit; not felt in rectum.	.....	Artificial anus; later lateral anastomosis; gangrenous ileum and ascending colon.	Eight days later 9 inch slough of intussusception passed by artificial anus.
103	Holländer (Israel), 14.	1896	...	21	M.	Enteric.	..	.....	.....	Resection 70 cm., E.-E. anastomosis, Murphy.	Button passed sixth day.
104	Kocher, 44.....	1893	...	20	M.	"	3	.....	.....	Resection 141 cm. small intestine.	
105	Mikulicz, 44.....	1889	...	43	F.	.....	8	.....	.....	Irreducible; (1) artificial anus; (2) resection, intussusception 6 weeks later; (3) and (4) for closure of fistula.	Fistula persisted 6 months.
106	Oderfeld, 38.....	1895	...	...	F.	Ileo-cæcal.	28 (?)	Felt by rectum.	.....	Resection of invagination attempted; resection and E.-E. anastomosis, ileum and colon; time, 3 hours.	Temporary fistula.
107	Pick, 84.....	1896	...	9	F.	Enteric.	7	Visible peristalsis.	.....	Irreducible; resection, E.-E. anastomosis, Murphy button; time, 45 minutes.	Button passed ninth day.
108	Parona, 45.....	1890	...	50	...	.....	5	Blood.	Enemata.	Artificial anus.	Fistula closed by plastic operation.

\* Corresponding number of bibliographical index.



TABLE II. SECTION D—UNSUCCESSFUL ABDOMINAL SECTION FOR NON-REDUCIBLE INTUSSUSCEPTION.

Case Number.	Operator.	Year.	AGE.		Sex.	Anatomical Variety.	Duration, Days.	Symptoms.	Previous Treatment.	Operation.	Time of Death.	Remarks.
			Months.	Years.								
109	Alsberg, 43*.....	1896	..	72	M.	.....	3	.....	.....	Gangrenous; resection, suture of ends, and lateral anastomosis.	1 day.	Post mortem, condition of anastomosis perfect.
110	Reported by Abbott (?), 86.	1892	..	16	F.	Enteric.	7	Vomit.	.....	Gangrenous; resection; E.-E. anastomosis; Czerny-Lembert.	9 days.	Post mortem, no union between divided ends.
111	Bier (Esmarch), 44	1894	..	1	M.	Colon.	4	.....	.....	Gangrenous, resection, artificial anus.	1 day.	Pre-existing peritonitis.
112	Bayer, 82.....	1892	..	7	M.	Ileo-cæcal.	7	Blood, vomit.	.....	Gangrenous; artificial anus; gangrenous area placed outside belly.	At once.	Post mortem, volvulus of colon.
113	Bristol, 16.....	1893	..	8	M.	.....	5	Blood.	.....	Artificial anus at apex of intussusception; 9 days later recurrence of symptoms; resection of ileum; ends sutured and lateral anastomosis with Senn's plates.	2 hours.	Shock.
114	Bier, 41.....	1891	..	31	M.	Ileo-cæcal.	5	.....	.....	Artificial anus in central end; 2½ months later, resection and lateral anastomosis, ileum and descending colon.	6 days.	Provisional suture of artificial anus.
115	Barker, 57.....	1891	4	..	M.	"	3	Felt by rectum.	Enema third day.	Resection of invagination (Barker's method), 2 inches of gangrenous ileum and cæcum.	.....	.....
116	Barker, 57.....	1891	..	12	M.	Enteric.	3	Blood; not felt by rectum.	None.	Irreducible; resection invagination (Barker's method).	.....	.....
117	Bush, 22.....	1893	4	..	..	"	3	.....	Enemata	Resection; artificial anus.	1 day.	.....
118	Carless, 78.....	1895	5	..	..	Double ileo-cæcal.	2	Vomit, blood; felt in rectum.	Enema under anæsthetic before operation.	Incision of sheath; reduction of inner invagination; artificial anus in colon.	6 hours.	Shock.
119	Cave, 29.....	1893	..	66	M.	Ileo-colic.	4	.....	.....	Artificial anus in lower ileum.	1 day.	Diabetic coma.
120	Cartledge, 49.....	.....	..	21	M.	Enteric.	.....	Vomit, tenesmus.	.....	Gangrenous; general peritonitis; resection 8 inches, E.-E., Czerny.	1 day.	Pre-existing sepsis.
121	Dalton, 7.....	.....	..	42	M.	Enteric (?).	Some days; acute.	Vomit.	.....	Ileum gangrenous; operation incomplete.	3 hours.	.....
122	Drobnik, 44.....	1892	..	15	F.	.....	.....	Felt in rectum.	.....	Gangrenous; colotomy, ascending colon.	4 days.	Septic peritonitis.
123	Erdman, 73.....	1895	8	..	M.	Enteric.	4	.....	Enemata.	Gangrenous; resection, E.-E. anastomosis, Murphy button.	1 day.	Pre-existing peritonitis.
124	Gussenbauer, 44.....	1894	..	12	F.	Ileo-cæcal.	4	.....	.....	Gangrenous; resection.	.....	Septic peritonitis.
125	Goode, 12.....	.....	13	..	M.	"	2	Felt by rectum.	Enemata (air and water) under chloroform first day; tumor almost disappeared.	Irreducible; artificial anus in ileum.	1 day.	.....
126	Harrington, 20.....	1889	..	..	..	Ileo-colic.	5	Not felt by rectum.	Enemata under ether third and fifth days.	Gangrenous; artificial anus; gut found perforated by injection (4½ feet pressure).	.....	.....
127	Horsley, 27.....	1890	..	11	M.	Enteric.	5	.....	.....	Gangrenous; general peritonitis.	On table.	.....
128	Hofmokol, 95.....	.....	..	38	M.	Colon.	.....	.....	.....	Resection.	1 day.	.....
129	Korte, 44.....	1892	4	..	M.	Ileo-cæcal.	3	.....	.....	Gangrenous; artificial anus.	1 day.	Post mortem, peritonitis; beginning gangrene of gut.
130	Lockwood, 91.....	1889	..	4	F.	Enteric.	5	Vomit, no blood.	.....	Resection; E.-E. anastomosis, Czerny-Lembert.	20 hours.	Post mortem, beginning peritonitis; anastomosis perfect.
131	Makins, 24.....	1888	..	4	F.	Enteric (?).	3	Not felt by rectum.	.....	Irreducible; excision 9 cm. ileum, with ends in wound for artificial anus	2 hours.	Shock.
132	Meek, 75.....	.....	..	8	M.	Enteric.	4	Vomit, no blood.	.....	Irreducible; resection 7 inches; E.-E. anastomosis, Murphy button.	1 hour.	.....
133	Milton, 63.....	.....	14	..	..	Ileo-cæcal.	.....	.....	Enemata (soda water).	Resection; E.-E. anastomosis, Czerny-Lembert.	10 hours.	.....
134	Nelson, 15.....	1893	..	8	M.	Enteric.	5	Vomit, blood; not felt in rectum.	.....	Gangrenous; artificial anus; 8 days later, resection; E.-E. anastomosis with Senn's plates.	8 days.	Exhaustion after second operation.
135	Obalinski, 44.....	1888	..	..	M.	Ileo-cæcal.	3	.....	.....	Resection; E.-E. anastomosis.	10 hours.	.....
136	Obalinski, 44.....	1892	..	26	M.	"	10	.....	.....	Gangrenous; resection, E.-E. anastomosis.	10 hours.	.....
137	Obalinski, 44.....	1893	..	60	M.	"	10	.....	.....	Gangrenous; artificial anus.	1 day.	.....
138	Obalinski, 44.....	1894	..	40	M.	"	4	.....	.....	Resection, E.-E. anastomosis.	5 days.	No post-mortem.
139	Obalinski, 44.....	1895	..	33	M.	"	5	.....	.....	Resection; cæcum and transverse colon; E.-E. anastomosis, Murphy button.	5 hours.	Shock; post mortem, anastomosis perfect.
140	Rydygier, 44.....	1889	..	42	M.	"	4	.....	.....	Gangrenous and general peritonitis; resection.	3 days.	.....
141	Rydygier, 44.....	1894	..	50	F.	"	4	.....	.....	Resection; artificial anus.	3 days.	Croupous pneumonia.
142	Rydygier, 44.....	1895	..	56	F.	"	8	.....	.....	Gangrenous; resection (Rydygier's [?] method).	3 days.	Pre-existing peritonitis.
143	Sick (Schede), 44.	1892	..	27	M.	"	2	.....	.....	150 cm. gut gangrenous; artificial anus.	3 hours.	Shock.
144	Sick (Schede), 44.	1892	2	..	M.	"	10	.....	.....	Irreducible; artificial anus.	1 day.	.....
145	Strong, 40.....	1888	6	..	M.	"	3	Fæcal vomit, blood.	.....	Resection 5 inches ileum, E.-E. anastomosis, Lembert.	.....	.....
146	Stutsgaard, 44.....	1894	..	37	M.	Enteric.	.....	.....	.....	Resection.	1 day.	.....
147	Usiglio, 87.....	.....	..	5	M.	Colon.	3	.....	.....	Gangrenous; operation abandoned.	8 hours.	.....
148	Wyeth, 69.....	1893	..	19	M.	Ileo-cæcal.	12	Blood; felt by rectum.	.....	Artificial anus.	5 hours.	Shock.
149	Walsham, 85.....	1889	..	3	M.	.....	3	Blood, mucus; felt by rectum.	Enemata (air and water).	Irreducible; artificial anus, small intestine.	.....	No post-mortem.

\* Corresponding number of bibliographical index.



plan of treatment according to the pathological condition existing in any given case.

TABLE III.\*

	Vomit.	Blood.	Felt in Rectum.	Mucus or Tenesmus.
One symptom.....	8	16	6	1
Two symptoms.....	10	22	7	4
Three symptoms.....	6	9	9	6
All symptoms one case.....	1	1	1	1
Total.....	25	38	23	12

\* Compiled only from cases contained in Table II.

As regards diagnosis, little, therefore, need be said, as nothing new or important has been evolved from these researches. Attention is called to the table of symptoms (unfortunately quite incomplete); it will be seen that the presence of a bloody discharge from the rectum is the most constant symptom, and certainly, when present in a young child and accompanied by the sudden onset of abdominal symptoms, must be considered pathognomonic. Its absence, or in fact the absence of any one of the typical symptoms, does not imply that intussusception does not exist. The infrequency of fæcal vomiting is important to note, as some practitioners obstinately refuse to entertain a diagnosis of intestinal obstruction unless this symptom is present.

Notes on the finding of a tumor by abdominal palpation have intentionally been omitted, lest misleading deductions be drawn from them, the value of such observations depending largely on our knowledge of the observer's individual characteristics.

It may be stated, though, that in general palpation of the abdomen yields definite signs of greater value and more frequently than in other forms of acute intestinal obstruction. The lesser and more localized distention usually permits us to palpate the outlines of the intussusception, according to its classical description, as a sausage-shaped tumor. Absence of a clearly recognized tumor is not, however, a proof that intussusception does not exist.

**Predisposing Causes.**—The writer has no comment to make concerning the usual causes believed generally to be exciting factors in the development of intussusception. The greater frequency of this condition in male children leads him to speculate whether the straining due to a tight phimosis or to a contracted meatus may not have here the same etiological value as is ascribed to these conditions in favoring the development of hernia and prolapse of the rectum. He has unfortunately no notes relative to such conditions, and does not remember to have seen any allusions to the possible causal relationship.

**Mortality.**—The mortality as collected in the literature is by no means thought to represent that of actual practice; as a rule, the latter is usually considerably higher. It is believed though that the mortality given in these tables (fifty-three per cent.) will perhaps not show so great a discrepancy as in other conditions. Operations for intussusception are not so very frequent, and the great interest attached to them makes it probable that a greater number of the cases is put on record irrespective of the final results. The large number of cases of purely acute intussusception here recorded, occurring in modern times, should give a fairer estimate than previous publications based on a smaller number and dealing with cases operated on before the development of abdominal surgery. Moreover, these cases are all pure forms of intussusception, not due to the presence of or subject to the complications of the attending new growths.

The condition of acute intussusception is one of intestinal obstruction, and its mortality, like that of intestinal obstruction, is due essentially to the duration

and cause of the obstruction. Also to be considered are, the site of the obstruction, the degree of the pathological changes of the intestine, the age (and sex). Another important factor having a particular bearing on the condition under consideration is the influence on the mortality of the variety of treatment employed, for it is believed that in no other form of intestinal obstruction is there a better opportunity for the exercise of good judgment as to what special procedure is indicated in any given case.

Results of operations alone are here based solely on Table II. Table I. and Table II. have been utilized in such observations as mortality according to age and sex, and site of obstruction.

TABLE IV.—MORTALITY AND OPERATIONS NECESSARY ACCORDING TO DURATION OF SYMPTOMS.\*

Day.	Died.	Cured.	Total.	Mortality, Per Cent.	Reduction.	Artificial Anus.	Resection.	Various.	Per Cent. Non-reducible.
First.....	0	13	22	41	22	..	..	..	0
Second.....	10	18	28	39	24	3	1	..	14
Third.....	18	11	29	62	18	4	6	..	38
Fourth.....	10	4	14	72	6	3	5	..	57
Fifth.....	10	4	14	72	6	3	5	..	57
Sixth.....	2	0	2	100	2	..	..	..	0
Seventh.....	5	4	9	55	5	2	2	..	80
Eighth.....	1	4	5	..	0	2	3	..	..
Tenth.....	3	0	3	..	0	2	1	..	..
Eleventh.....	0	1	1	..	1	..	..	..	..
Twelfth.....	1	1	2	..	1	..	..	..	..
Fourteenth.....	1	0	1	..	1	1	..	..	..
Third week.....	1	1	2	..	2	..	..	..	..
Fourth week.....	0	3	3	..	1	..	1	1	..
No date.....	8	6	14	..	8	1	4	1	..
Total.....	79	70	149	53	99	22	24	4	33

\* In these tables fractions of 0.6 or more are counted as a unit.

A glance at Table IV. shows that the total mortality for one hundred and forty-nine cases is fifty-three per cent. The first and second days show a mortality rate inferior to the general mortality, while the four succeeding days show a steadily increasing mortality, in each instance greater than the average. The end of the week shows a beginning decrease of the mortality, which it is to be hoped no one will undertake to explain by showing that better results follow delayed interference. After the first week we encounter the class of cases that merge from the acute into the sub-acute variety of symptoms.

The statistician working to prove that the mortality is in reverse ratio to the duration, would prefer that the mortality rate of the first and second days could be reversed; but on sober reflection the proportion can only appear natural, for these cases occurring on the first day are those in which the symptoms and their underlying condition may be properly called hyperacute. The writer found the same ratio of mortality some years ago when studying the fatality of appendicitis, when it appeared that the mortality rate of operation performed the first day was greater than that of operations performed on several days following. To the clinician of larger experience such conditions are well known and appreciated at their true value.

TABLE V.—MORTALITY ACCORDING TO CONDITION OF THE INTUSSUSCEPTION.

	Number of Cases.	Died.	Mortality, Per Cent.
Reducible.....	99	38	38
Irreducible.....	9	6	67
Gangrenous.....	21	20	95
Irreducible or gangrenous.....	20	15	75
Total.....	149	79	53

As showing the acuteness of the process, it may be mentioned that in the nine fatal cases occurring on the first day, two died with symptoms of recurrence; one



died on the first day in collapse (eight months old); two died on the first day, autopsy showing general peritonitis; one died from intestinal paralysis; one on the first day with beginning sloughing of the gut and general peritonitis.

The mortality, according as the condition was found to be reducible or otherwise, is in direct proportion to the duration of symptoms. Of ninety-nine reducible cases thirty-eight died, mortality of thirty-eight per cent., while in the remaining fifty cases, in which reduction could not be performed, the mortality was eighty-two per cent., or more than double. As Table IV. shows how the proportion of non-reducible cases rose steadily after the first day, it requires no further demonstration that an early intervention is necessary for reduction and cure of the intussusception by virtue of its being reducible.

TABLE VI.—MORTALITY ACCORDING TO PROCEDURE EMPLOYED.

	Number of Cases.	Died.	Mortality, Per Cent.
Reduction.....	99	38	38
Artificial anus.....	22	19	86
Resection.....	24	19	79
Various.....	4	3	82

The mortality, according to procedures employed, is virtually only a check on the accuracy of the last-mentioned conditions, showing necessarily the same mortality for reduction—eighty-six per cent. for artificial anus, and seventy-nine per cent. for resection, or for both procedures eighty-two per cent. The significance of these figures will be further considered in another part of the paper. Under the heading “Various” are included three operations that were either abandoned or hopelessly incomplete, and one entero-anastomosis (cure).

TABLE VII.—MORTALITY ACCORDING TO ANATOMICAL VARIETY.

Variety.	Died.	Cured.	Mortality, Per Cent.
Enteric.....	20	11	64
Ileo-cacal.....	45	32	58
Ileo-colic.....	13	5	72
Colon.....	12	12	50

As regards the mortality according to the location, Table VII. shows that the ileo-colic variety heads the list with a mortality of seventy-two per cent., while the colon has the lowest—fifty per cent. These deductions, however, the writer believes to have only a relative value, as they are drawn from only one hundred and fifty cases out of two hundred and thirty-nine, and because doubts must in many instances arise as to the correctness of the classification, owing to the incomplete or loosely recorded details. The ileo-colic and enteric varieties have always been regarded as particularly

TABLE VIII.—MORTALITY ACCORDING TO AGE.

Age.	Died.	Cured.	Mortality, Per Cent.
Three months or under.....	14	3	82
Six “ “.....	31	17	64
Twelve “ “.....	17	12	58
Five years or under.....	17	7	71
Ten “ “.....	6	10	37
Fifteen “ “.....	11	5	68
Adults.....	38	23	62

Under 1 year, 65 per cent. mortality.  
“ 15 years, 61 “ “ “  
Adults, 62 “ “ “

fatal, and it is rather remarkable that the latter does not show even a greater mortality. An explanation may perhaps be found in the considerable number of recent cases recorded, for in this class, when reduction

cannot be effected, the improvement in the technique of reunion of the intestine after resection should prove of the greatest practical value, as in former times an artificial anus was the only resource, and this procedure, as we have seen, is necessarily attended by the highest mortality.

The mortality, according to the age, is of great importance. The observations are based on two hundred and eleven cases, their relative proportions being indicated in the accompanying table. The latter shows so remarkable a distribution of the mortality that doubts might well be raised against the value of such statistics, were they not derived from such a large number of cases. Dividing the age into three classes—infants (one year or under), children (fifteen years or under), and adults—we find only four per cent. difference between the highest and the lowest death rate. (It must be borne in mind that the mortality is represented by the sum total of the two tables and not by the one hundred and forty-nine cases since 1887). The writer believes that these figures have a value in calling attention to the fact that the mortality in intussusception is due not so much to the tender age of the majority of the patients but to the condition; also that this latter circumstance should prevent us from being sceptical of the possibility of improving our results, and lead us to discard the prevalent belief that we are dealing mainly with a class of patients whose age alone necessarily precludes a favorable result. While the tables certainly emphasize the terrible mortality in very early life, the improvement of eighteen per cent. in the second quarter of the first year is certainly gratifying and believed in all fairness to be sufficiently pronounced to justify such a conclusion.

TABLE IX.—MORTALITY ACCORDING TO SEX.

	Died.	Cured.	Mortality, Per Cent.
Male.....	53	29	57
Female.....	36	13	73

**Mortality According to Sex.**—For reasons which are in general sufficiently accepted and fairly constant, the female sex is supposed to show a larger proportion of recoveries after operations in general. The favoring elements generally ascribed as influencing the lesser female mortality would not seem to apply here, where the larger proportion of the cases was in children.

The mortality according to the method of relief employed will be more appropriately discussed under treatment.

It may be timely here to contrast the mortality of intussusception with that of intestinal obstruction in general. The writer has collected nearly six hundred cases of acute intestinal obstruction from causes other than intussusception, occurring within the same period of time (1888–1896) as the table of one hundred and forty-nine cases here recorded. They have been chosen with the same care relative to the exclusion of cases due to new growths, etc., and more rigidly as regards duration, none being included in which the time is not definitely stated, whereas, for the sake of completeness in these tables, a few cases, believed from their histories to be acute, have been included. In addition to the usual etiological causes of intra-abdominal obstruction, these cases include a large number of operations for gangrenous hernia, and yet the mortality in these cases, giving rise to a very large number of complicated and extensive operations, is only 42.01 per cent., while intussusception under the same conditions shows a mortality of fifty-three per cent. May not these figures, contrasted with each other, be taken to show that either we are dealing with a more serious



form of intestinal obstruction or that our methods of dealing with intussusception need improvement? The writer is strongly impressed with the reality of the latter possibility. The age alone of the subjects should not give so wide a variance. Moreover, a reducible intussusception certainly appears to offer for speedy and simple operation conditions that do not exist in the majority of cases of intestinal obstruction. The intussusception, however, is not always reducible, hence the difference. Our figures show that the mortality of the reducible intussusception is inferior to that of other forms of obstruction, as thirty-eight is to forty-two. Therefore, if we aim to reduce the mortality of intussusception to the level of or below that of the general figures of intestinal obstruction, we must operate while reduction is possible. To accomplish the latter purpose we must operate at the earliest possible moment, and that means refraining from wasting precious time in attempts at reduction by inflation per rectum, except in a very limited class of cases, and such an attempt to be made only with the determination to resort to abdominal section immediately, if such inflation does not at once accomplish its purpose.

**Treatment by Inflation of the Bowel by Enemata of Fluids (or Air).**—It is probably not an exaggeration to say that if all cases of intussusception were treated at the onset, or say within forty-eight hours, by abdominal section, without any previous attempts at reduction, the mortality, while still considerable, would in all probability be very much less than the present figures. The writer is far from believing that mechanical distention should be altogether discarded, but would very much limit its application.

The vital argument against treatment by enemata of fluids or air is that such a procedure, should it not entirely succeed, delays operative measures. Also that it is uncertain, in that it may give rise to the deceptive impression that the invagination has been entirely reduced, while an unreduced intussusception, no matter how small, is still an obstruction of undiminished danger. A glance at the general tables will show how many instances occurred of deceptive successes following inflation, before resort was finally had to abdominal section. The records of such cases show that recognition of the success of the reduction must be very difficult from physical signs alone. To allow the patient to recover from the anæsthetic and to wait for symptoms is contrary to the indications of treatment of intestinal obstruction, which should consist in immediate and certain action.

Enemata are distinctly dangerous. The literature of intussusception in general is full of reports of cases of perforation or rupture of the intestines by the various agents used to reduce the invagination. Moreover these accidents are not invariably the result of what is unmistakably too great force or pressure. A striking instance of rupture from a hydrostatic pressure of only four and one-half feet is Case 126, Table II., reported by Harrington, that of a child five years old. The ileum was found perforated as the direct result of a fluid enema administered on the fifth day. Another typical example of perforation is reported by Mr. Fenwick,<sup>32</sup> where an intussusception in a six-months old child was apparently successfully reduced on the second day by an enema. Death occurring almost immediately afterward, the autopsy showed ulceration and perforation of the gut, which had not been reduced. This case shows plainly that the danger of perforation is not limited to interference in those cases that have lasted for a considerable period of time.

Another disadvantage of reduction by enemata is to be found in the tendency of the intussusception to recur; a number of such instances are to be found in the tables. Case 48, Table II., is an interesting

example: the invagination was twice reduced and recurred twice before abdominal section was performed. While it may be rightly advanced that such recurrences are sometimes seen after abdominal section, they are undoubtedly rarer. Moreover, abdominal section permits of the employment of prophylactic measures against such recurrences, many surgeons having recently recognized the necessity of "anchoring" a newly reduced bowel, and in all probability such a procedure will become the rule when its necessity becomes more generally recognized.

Under what conditions then, if any, shall we make a trial of high injections before resorting to abdominal section? It seems to the writer that to attempt to reply to this question dogmatically would be a confession of inability to appreciate the complexity of the circumstances under which intussusception may be encountered. His feeling is that a single attempt (in a manner to be described elsewhere) may be made in the first twenty-four hours. If the condition is one of very great intensity of symptoms, it will perhaps be wisest to refrain from making such an attempt, for the reason that even on the first day reduction alone will not always be a sufficiently effective treatment of existing pathological conditions. A study of the analysis of the mortality of the first day (see above) will show that in at least three of the cases further procedures were called for. The case of beginning sloughing of the colon found at the autopsy is a sufficient proof of this contention.

In the second twenty-four hours, while a certain proportion of cases will in all probability yield to mechanical treatment, its usefulness becomes still more restricted, as exemplified by the twenty-eight cases occurring on the second day (Table IV.), when in four instances other procedures than reduction were found necessary.

After the second day the writer believes that the possibility of relief is so small and the probability of doing harm so great that a preliminary trial of the enemata should be omitted, unless there are some specially good reasons for yielding to the temptation of resorting to them; for the tables show that after the third day, even after the abdomen was opened, a non-reducible condition was found in proportions varying from fifty-seven to eighty per cent.

A small percentage of cases, which may be called the subacute variety, may in the later days, say in the second week, offer conditions which might justify a preliminary trial of distention. These are the cases whose symptoms are a pretty accurate reflection of the lack of severity of the general or local condition, showing neither shock nor sepsis. Such cases, however, would from their excellent condition in all probability do well if subjected to the more radical and certain operation of abdominal section, if performed under favorable circumstances.

The pressure which can be used with safety has been shown to be limited. The same restriction applies to the amount. Mr. Pick<sup>34</sup> would limit the amount in a child under one year to a pint and a half, and the pressure to three feet. Parker cites a case in which an injection of one pint in a three-months-old child caused perforation, the autopsy showing a small rent in the lower part of the intussusception. It may be said that such fatalities are rare, and that in many instances larger amounts and greater pressure have been successfully employed and are usually necessary for success. The writer would reply that what has happened can, and in all probability will, occur again; likewise that dead-house experiments on non-morbid intestinal tissues are so little in relation to the conditions one meets in actual practice that their possible value cannot be discussed here.

The writer would therefore recommend that in those



cases in which he has tried to show the justifiability of a preliminary trial of inflation the attempt should be made as a stage preparatory to immediate opening of the abdomen, if the inflation does not at once overcome the obstruction. All preparations for operation having been made, the patient should be anæsthetized and the outlines of the intussusception carefully studied. A rectal tube should be passed, care being taken that it does not double up on itself. The injected fluid (preferably warm to avoid shock) should then be allowed to run in by gravity, the pressure being gradually raised. It is probably best to have the patient's pelvis well elevated. The operator should meanwhile keep accurate track by the sense of touch of the resulting distention and its influence, if any, on the intussusception. His perceptions of these results should guide his judgment as to the necessary pressure, rather than actual amount, but he must remember that after attaining a hydrostatic pressure of four feet, and even less with infants, he is treading on dangerous ground. Still, even here the conditions pertaining to the individual case must be his chief guide.

If, as a result of the enema, the operator can absolutely recognize by the sense of touch that the intussusception has entirely disappeared, the operation may



FIG. 1.—Showing Wrinkling of Sheath. (After Braun.)

be postponed. The latter term is used advisedly, for the operator should take the attitude that, while he is certain that he has so far been successful, the conditions are likely to recur within the next few hours or days, and all preparations must be kept in readiness. Should the intussusception recur after successful reduction, the writer believes that the abdomen should then be opened at once, lest by further delay the "golden moment" be allowed to pass.

(Braun<sup>23</sup> has called attention to a frequent source of mistaken belief in the successful performance of reduction, in that the wrinkling and stretching of the sheath (Fig. 1) allows of extensive variations in the length of the intussusception; for instance, one may have the impression that the intussusception extends only three or four centimetres into the sheath, while direct examination will show that the portion of the sheath involved measures twenty-five centimetres).

The writer declines to discuss means of inflation other than by the force of liquids acting under gravity. Such procedures, while attractive by reason of their ingenuity, are dangerous and less suited to the purposes of accurate observation of results.

Can a comparison be drawn between the relative value of treatment by enemata alone, by enemata prior to laparotomy, and by immediate laparotomy without recourse to preliminary measures? It would seem to the writer as impossible to obtain fair deductions from such a comparison as in any other class of diseases which present varying conditions, calling in some instances for medical, *i.e.*, bloodless procedures, in others for surgical or operative relief. No clinician of wide experience would to-day attempt to show such a contrast between surgical and non-surgical cases of

diphtheria, cholelithiasis, appendicitis, etc. Our aim should be to obtain the greatest diminution of mortality, and it would seem preferable to expose one's self to the reproach of having done a needless operation than to that of having sacrificed a life from non-intervention. Therefore it would seem preferable to yield to an excessive desire for certainty, as illustrated by Case 61a (Table II.), in which the surgeon, not feeling absolutely certain that the attempt at mechanical reduction had been perfectly successful, performed abdominal section only to find that the intussusception was already reduced.

**Treatment by Abdominal Section.**—The writer hopes to be pardoned if he takes the liberty of giving a few hints as to the preparations for operations not conducted in an institution. A sufficient number of assistants should be obtained, if such are available, and the duties of each one clearly defined. The house need not be turned topsy-turvy, nor carpets, drapery, curtains, etc., removed except for direct economy. In fact, it is better not to do anything to stir up a dust in the room where the operation is to be performed. The best-lighted room should be chosen, provided it can be well heated if the weather be cool. Sheets, towels, etc., can be properly sterilized by boiling half an hour. It is well to remember that in an emergency even five minutes' boiling gives a tolerably high degree of sterilization. Among other methods of sterilizing the patient's skin is the simple one of scrubbing with green soap and washing off in ninety-five per-cent. alcohol. For the hands\* a simple and very effectual method is scrubbing with hot water and soap, rinsing off, and then rubbing the hands and arms with a paste made by taking in the palm of the hand a teaspoonful of washing-soda, adding a crystal of chloride of lime about half the size of the terminal phalanx of the little finger, and adding a few drops of water. Rubbing this mass produces a paste, which becomes smoother with the prolongation of the rubbing. The nascent chlorine thus given off has been proven one of the most powerful germicidal agents in its action on the skin yet discovered. Some boiled water should be used to wash off the paste after three or five minutes' use. The instruments should be boiled for half an hour; a teaspoonful of washing-soda added to the water increases the efficacy of the sterilizing process and keeps the metallic instruments from rusting. Once properly rendered aseptic, neither the hands nor the instruments should be contaminated by touching anything that has not been similarly disinfected. The failure to observe the latter rule is to-day probably responsible for the greater part of the fatal results from sepsis, which has not yet been eliminated as a source of death as a sequel to operation.

Every preparation requisite for the possible performance of intestinal resection and anastomosis should be in readiness, all intestinal sutures properly prepared and at once available if needed.

**Choice of Anæsthetic.**—The writer could wish that the recorded cases might have furnished some details regarding the choice of the anæsthetic employed, but only few records could be found. Even in the United States, where ether is generally given the preference, chloroform is very largely used to anæsthetize children, and will probably be found the best agent when operating for intussusception in children. The writer believes that not sufficient attention has been given to the temporary stimulant effect following substitution of ether for chloroform, after the latter has been given some time. Usually such a change is made if the chloroform narcosis is not satisfactory, but the writer would urge a trial of a routine mixed anæsthesia, the first half under chloroform, the second under ether.

\* For fuller details see article by R. F. Weir<sup>76</sup> on this subject.



**Operation.**—The incision should be in the median line, and from the onset should be generous, and extended without hesitation if sufficient space is not obtained for ready and speedy handling of the intestines. If no point of definite location of the invagination is known, and the first comprehensive sweep of the fingers over the abdomen reveals nothing, the ileo-cæcal valve should be sought for, and the intestines systematically examined from that point in either direction. If the cæcum is collapsed we know then that our search must be directed upward in the small intestine. The intussusception having been located, it should be examined by direct inspection of its whole extent. The first glance may show that reduction is impossible or unwise. Attempts at reduction are best made in the direction of working away the sheath from the invagination rather than pulling the latter out, such a procedure often causing extensive tears of the gut at some adherent point. To guard against extravasation of fæces, the rest of the intestines and the abdominal cavity should be protected by large gauze pads. If the intestine has been successfully reduced, a close examination should be made of it to determine if any portion is so injured as to impair its vitality. If there is a little doubt as to its integrity, one may employ Hahn's method of surrounding that portion by a gauze packing, over which the sutures of the abdominal wall may be provisionally tied. By such a precaution the general peritoneal cavity is shut off from absorption of septic material from possible sloughing of the intestinal walls, and if perforation takes place it does so under the conditions of an extraperitoneal lesion. Twenty-four hours' observation under such conditions will usually suffice to determine the ultimate fate of the intestine, whether it can safely be returned into the belly or whether further procedures are indicated. The writer was a witness of this treatment in the case reported by Curtis, Case 69, Table II., and can add his testimony to the efficacy of the procedure. While the gut was so isolated, the patient had a free movement of the bowels, showing that the skilful disposition of the gauze, while accomplishing its purpose, had formed no impediment to the free passage of intestinal contents.

Lindemann's case (No. 37, Table II.) is another example of the wisdom of this procedure.

If the intestine cannot be safely or effectively reduced, what shall be our attitude?

The first point to decide is whether the irreducible intussusception is free from septic conditions or sloughing. Great care, experience, and judgment are required to be able to answer this question in the affirmative.

An acute intussusception that cannot be reduced is in all probability rarely solely an irreducible condition—that is to say, it is usually accompanied by lesions of a septic nature, which endanger life both by septic infection *per se*, and secondarily by permitting extravasation of the fæcal contents. If the conditions are such that doubt exists, the wisest course is to treat the intussusception as of the gangrenous variety, for which, as will be shown later, only one broad line of conduct is permissible.

Having determined then that we have to deal with a purely irreducible condition, we have the choice of the following methods:

1. Artificial anus.
2. Entero-anastomosis.
3. Partial resection.
4. Typical resection.

(1) A purely irreducible intussusception presents the only condition in which a primary artificial anus (as a sole measure—see below, combination of resection and artificial anus) is ever permissible. Even here its use must necessarily be limited. In all

forms of intussusception not exclusively limited to the large intestine (and such cases are infrequent) the artificial anus is necessarily made in the small intestine. Except for the lower portion of the ileum, an artificial anus in the small intestine is incompatible with the preservation of life except for a very brief period of time. Even in the lower ileum nutrition is seriously impaired and much suffering results from the excoriating character of the fluid intestinal contents. The procedure should therefore be reserved for those cases whose general condition is so desperate that any further procedures must necessarily be followed by death. For the large intestine the indications are much more favorable, and in some cases will constitute the most judicious form of treatment. A decision to limit one's self to an artificial anus, even under these circumstances, must be undertaken with the full appreciation of the after-history of these cases. In these tables only three cures after artificial anus are recorded, and all three required more or less extensive operations to effect such a cure. Among the fatal cases are included three in which life was prolonged for a variable period of time, but these patients succumbing after resection, etc., of the fistula, they are properly classed among the fatal cases. That is, in six cases of artificial anus, in which subsequent operations were found advisable or necessary, the mortality was fifty per cent., and these facts should be given due consideration by the operator before his decision to make an artificial anus is reached.

(2) Entero-anastomosis. By this term we mean the formation of an anastomotic communication between the segments of the gut above and below the intussusception, thus side-tracking the affected portion. This operation may compete with the next two to be described, but not with artificial anus, the latter being reserved for the desperate cases.

Entero-anastomosis may be performed by means of sutures alone, an operation requiring for its proper and speedy performance considerable technical skill, but constituting more nearly the ideal of intestinal anastomosis, or by means of some mechanical device. The Murphy button will here give a very speedy and simple means of reunion, and should doubtless be preferred when time is a very important element. It is to be borne in mind that anastomosis by any mechanical device that must eventually perform the rôle of an intestinal foreign body is not an ideal method.

(3) Partial or atypical resection, or resection of the intussusception through an incision in the sheath.

Various procedures, differing chiefly in minor or technical details, have been described, and to them several operators' names have been appended (Jesset, Barker, Rydygier).

The following may be described as the essential steps of the operation (Fig. 2): Circular running suture securely uniting the invaginated gut to the sheath at the neck; longitudinal incision of the sheath; cross section of the invaginated portion; sutures of

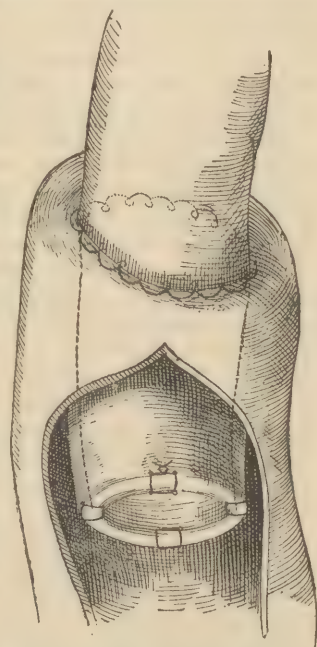


FIG. 2.—Sheath Opened and Invagination Resected. (After Rydygier.)



varying nature and extent of the proximal cut edge, especially of the mesenteric portion for the arrest of hemorrhage; extraction of the (now) free portion of the resected intestine either through the longitudinal incision, or, if long and accessible, by the rectum from below; suture of the incision; closure of the abdomen.

For the successful performance of this operation, absence of firm adhesions within the sheath is desirable. The operation under favoring conditions is simple, speedy, and sacrifices less intestine than a typical resection, as the sheath is preserved intact. In one of Mr. Barker's<sup>37</sup> cases the whole duration of the operation was only half an hour.

(4) Resection of the entire intussusception. The performance of this operation for irreducible intussusception will probably occur less frequently with the further familiarity with the last described procedure, the latter being a comparatively recent operation. Before it is undertaken, the reasons for preferring it to the last two operations should be established. These may be briefly stated to be: for entero-anastomosis, hesitation at leaving a considerable portion of the gut to "take care of itself," or (rarely) technical difficulties in performing entero-anastomosis; for resection of the invagination, failure to separate firm adhesions; for either procedure, if there is any suspicion relative to the intestine's non-septic condition.

**Treatment of Gangrenous Intussusception.**—The writer believes that here the conditions requiring relief are so urgent and so clearly defined that there can be little choice in the methods of operating. The patient must be relieved of the obstruction and of the infection attending gangrene. Remedying the first condition without remedying the second is equivalent to doing nothing at all. To make an artificial anus under such conditions is simply an act of mercy intended to mitigate the sufferings attending dissolution. We are face to face with a desperate condition and one doubly sad, in that in many instances the responsibility for this condition is on the shoulders of some one who ought to have known better. To operate in such a manner and so extensively as to meet the requirements of the condition is nearly always certain to be followed by death; not to do so is to abandon the patient to his fate. It may be objected that death is inevitable in most cases from the existing general peritonitis, which of course no amount of exsection of the intestine can deal with. To this objection the writer would say that cases of diffuse purulent peritonitis do sometimes end in recovery. That they are rarities is freely acknowledged, and the writer's scepticism about many alleged cures of general peritonitis is well pronounced, as many such cases are more probably forms of extensive localized peritonitis. Still, if by operating even only one in a hundred lives is saved, shall we not make the attempt? The chances are not so desperate, however, as the question might lead one to judge. The present methods show a gain in saving of life that could not have been conjectured two decades ago. In 1885 that very careful observer, Braun, could find no record of cure by operation of non-reducible intussusception. The records of these one hundred and forty-nine cases here appended, beginning in 1888, show that nine such cases have been cured by the improvements of modern surgery, whose progress is nowhere more marked than in intestinal operations.

While the experience with the antistreptococcus serum is still too limited to allow of more than a hint as to its possible usefulness, and while realizing that any unduly enthusiastic views may lead to delusions which so easily took possession of the profession regarding other possibilities in the line of antibacterial remedies, the writer nevertheless believes that we should not fail to make use of this or any similarly

devised principle of treatment that holds out hopes of supplementary aid in so grave a condition as gangrenous intussusception.

As regards operative treatment the writer recommends only:

1. Resection with immediate union of divided intestine; or,

2. Resection with utilization of divided ends for a temporary artificial anus.

(1) It is thus evident that any method that does not provide for removal of the gangrenous area is rejected. The removal should not be niggardly, the healthy area should be encroached upon to a sufficient extent to insure radical cure. The writer has collected numerous instances in which an apparent hesitation to follow the above recommendation has destroyed the chances of what would otherwise have been a good operation. An example of necrosis of the anastomotic edges is shown in No. 110, Table II. Moreover, resection of a large portion adds comparatively little to the time or difficulties of the operation. Astonishingly large amounts have been successfully removed with little or no influence on the general health. Cases 103 and 104, Table II., are instances of the truth of this assertion. Other examples are to be found in the following:

Rocci and Fantino <sup>39</sup> .....	310 cm.,	ileum.
Köberle.....	205 "	small intestine.
Hinterstossier <sup>94</sup> .....	186 "	ileum.
Kocher.....	160 "	small intestine.
Braun.....	137 "	" "
Schlange.....	135 "	" "

TABLE X.

Results of Resection.	No. of Cases.	Cured.
End-to-end suture.....	12	2
Partial resection.....	3	0
End-to-end anastomosis (Murphy button).....	6	3
Lateral anastomosis and method unknown.....	3	0
	24	5

Mortality, 79 per cent.

The cases are too few to venture on any significant claims for the advantages of any one method. The proportion of recoveries (fifty per cent.) with the Murphy button is encouraging, and should certainly warrant a further trial of this method. Undoubtedly the time-saving element is its chief advantage, and the operator with limited experience in intestinal work will in all probability often get the best results with this simple device.

A record of Maunsell's method does not appear in these tables, but his simple device can well compete with the Murphy button. It takes the least time of any of the methods by suture alone, and is free from the disadvantages attending the use of any mechanical aid.

The writer is compelled, though somewhat regretfully, to refrain from a further prolongation of this paper by the consideration of the indications for the employment of the several methods of typical resection.

(2) If after the excision of the gangrenous area we feel that the patient's failing strength will not permit further measures, we can bring the ends of the bowel into the wound (or if preferred into a separate wound), as a temporary artificial anus. These ends should be so placed with relation to the external wound and to each other as to permit ultimately of the easiest methods of repair.

Before closure of the abdomen the operator should convince himself that no second intussusception or other form of obstruction exist. Cases 79, 91, and 112, Table II., show the necessity of such precautionary measures.



As rapidity of operation is desirable, the following method of closure of the abdominal wound is given, as this part of the operation is often less in keeping with the desired end than the rest of the operation. Transfix all the layers with a Peaslee needle, entering in the skin on one side (the fascial layer being drawn well forward by the assistant) and passing through the peritoneum. The needle then transfixes the opposite side in reverse order, emerging at the skin. A piece of silkworm gut is threaded in the eye and the needle withdrawn. Should the condition allow the expenditure of more time, the peritoneum may be sutured separately with catgut, and not included in the other sutures. Should the condition be very good, the fascial layer may be united separately to guard against hernia. In aseptic cases, interrupted buried silkworm sutures have given the writer most gratifying results, both immediate and remote.

**Shock—After-Treatment.**—The writer does not believe that the degree of shock exhibited by children is so intense as usually supposed. We must differentiate between the shock resulting from the condition necessitating operation and that from the operation proper. Children bear serious operations on the osseous system with no more depression than is exhibited by adults, on condition that the amount of hemorrhage is small. While an explanation of the source of shock does not banish the condition as we have to meet it, it emphasizes the importance of prophylaxis—not to let the morbid conditions exist or progress to a condition of shock which *per se* is hopeless.

Much can be done, however, to tide over a condition of shock, and attention to minor details may prove the turning-point in obtaining a successful result after operation. The chief stimulants in their order of importance are heat, alcohol, and drugs. Loss of heat at any stage must be zealously guarded against, and in the operation contact with moist cloths, irrigating fluids, etc., avoided, owing to the cooling effects of evaporation. In very pronounced shock alcohol should be given hypodermatically, as the state of the circulation will probably allow but little absorption by the rectum. Of drugs, strychnine hypodermatically is probably the most efficient. Camphor dissolved in olive oil is a most valuable subcutaneous agent. Stimulation by drugs requires the exercise of great judgment and accurate observation of their action. The writer feels quite sure that a not insignificant proportion of operative cases terminate fatally from the injudicious administration of dangerous stimulants.

The injection of warm saline solutions into the circulation, either directly into a vein or subcutaneously, is no longer limited to the treatment of shock dependent on hemorrhage. While never having had occasion to resort to it in children, the writer would urge that a trial of this procedure be made in combating the shock in operations for intussusception in children. It should not be used as a last resort, nor should its accomplishment interfere with the operator; to some competent assistant should, if possible, be delegated the sole duty of performing it whenever called for. In the first few hours after recovery from the anæsthetic the pain and restlessness may compel one to give some form of opiate, but in general it is best withheld in order not to confine the bowels. The profession is now very nearly a unit on the advisability of obtaining early and free movements of the bowels after abdominal operations, and the treatment is of especial value if there is any suspicion of peritonitis.

A. J. McCosh,<sup>2a</sup> of New York City, is so convinced of the wisdom of the above that he has adopted a radically certain method of obtaining the desired result. Before closing the abdomen he injects an ounce or so of a saturated solution of Epsom salts directly into the intestine, a large antitoxin syringe being used.

The puncture is closed with a Lembert suture. On recovering from the anæsthetic the patient is furthermore given ten grains of calomel.

46 WEST THIRTY-THIRD STREET.

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